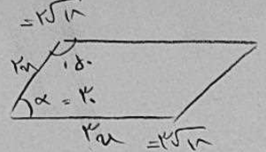
۱-



$S = 2x \times 3x \times \sin\alpha = 54$ $\quad (\sin\alpha = \frac{1}{2})$ $\quad x^2 = 18 \rightarrow x = \sqrt{18}$

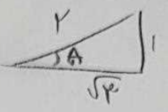
محیط $= 2(5\sqrt{18}) = 10\sqrt{18}$ $\quad 3\sqrt{2}$

۲-

$\hat{S}_{ABC} - S_{A\hat{E}D} = \frac{1}{2} \times 5 \times 7 \times \sin A - \frac{1}{2} \times 4 \times 7 \times \sin A = \frac{7}{2}\sin A = \frac{7}{4}$

$\sin A = \frac{1}{2}$

$\tan A = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3} \leftarrow$



۳-

$\frac{|\sin\alpha|}{\cos\alpha} = \frac{-1}{\frac{\cos\alpha}{\sin\alpha}} = -\frac{\sin\alpha}{\cos}$

چون (−) آمده $\sin\alpha$ منفی بوده

$\frac{1}{|\cos\alpha|} - \frac{\sin\alpha}{\cos\alpha} = \frac{1+\sin\alpha}{|\cos\alpha|}$

$+\left(\frac{\sin\alpha}{-\cos\alpha}\right)$

چون $\cos$ منفی بوده منفی آمده پشتش $\Leftarrow$ $\cos\alpha = -$

α در ربع سوم است.

۴-

$\beta + \alpha = 180^\circ$

$\tan\beta = \frac{\Delta y}{\Delta x} = \frac{1.5}{2} = \frac{3}{4} \longrightarrow \cot\beta = \frac{4}{3} \xrightarrow{\text{زاویه مکمل}} \cot\alpha = -\frac{4}{3}$

$\tan\left(\frac{\pi}{2} - \alpha\right) = \cot\alpha = -\frac{4}{3}$

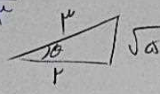
۵-

$\frac{3\cos(248) - 2\sin(158)}{\sin(202) - \cos(292)} \quad \frac{3\cos(270-22) - 2\sin(180-22)}{\sin(180+22) - \cos(270+22)}$

$= \frac{-3\sin 22 - 2\sin 22}{-\sin 22 - \sin 22} = \frac{-5\sin 22^\circ}{-2\sin 22^\circ} = \frac{5}{2}$

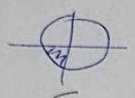
۶- $\dfrac{\sin\left(\frac{\pi}{2}+\alpha\right)-\sin(\alpha-\pi)}{|\tan^2\alpha-1|}$

$\cos\alpha=\frac{2}{3}$



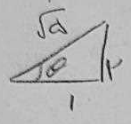
$\dfrac{\cos\alpha+\sin\alpha}{\tan^2\alpha-1}$ $\quad\dfrac{\frac{2}{3}-\frac{\sqrt{5}}{3}}{\left(\frac{\sqrt{5}}{2}\right)^2-1}=\dfrac{\frac{2-\sqrt{5}}{3}}{\frac{5-4}{4}}=\dfrac{(2-\sqrt{5})4}{3}=\boxed{\dfrac{8-4\sqrt{5}}{3}}$

۷- $\sin\alpha=2\cos\alpha$



$\cos\alpha=?=\dfrac{-1}{\sqrt{5}}=\boxed{-\dfrac{\sqrt{5}}{5}}$

$\dfrac{\sin\alpha}{\cos\alpha}=2=\tan\alpha$



۸- $2mx+(m^2-1)y=2 \rightarrow y=\dfrac{-2m}{m^2-1}x+2$

$\tan 60^\circ=\sqrt{3}=\dfrac{-2m}{m^2-1}$ $\quad\sqrt{3}m^2-\sqrt{3}=-2m$

$\sqrt{3}m^2+2m-\sqrt{3}=0$

$m^2+2m-3=0 \quad (m+3)(m-1)=0$

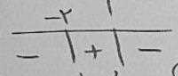
$\frac{-3}{\sqrt{3}}$ $\quad$ $\frac{1}{\sqrt{3}}$

$\left|\dfrac{-3}{\sqrt{3}}-\dfrac{1}{\sqrt{3}}\right|=\dfrac{4}{\sqrt{3}}=\boxed{\dfrac{4\sqrt{3}}{3}}$

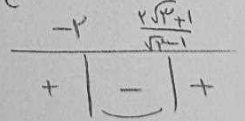
۹- $\tan\left(\frac{\pi}{2}-x\right)=\dfrac{1-m}{2+m}$ $\quad -\frac{\pi}{4}<x<\frac{\pi}{4}$

$\frac{\pi}{4}>-x>-\frac{\pi}{4} \rightarrow \frac{\pi}{2}>\frac{\pi}{2}-x>0$

$\sqrt{3}>\tan\alpha>0 \quad \sqrt{3}>\dfrac{1-m}{2+m}>0$



$\Rightarrow \dfrac{2\sqrt{3}+\sqrt{3}m+1-m}{2+m}=\dfrac{2\sqrt{3}+1+(\sqrt{3}-1)m}{2+m}$



①و② $\rightarrow \boxed{(-2,1)\in m}$

۱۰- $\tan(300^\circ)\cdot\cos 210^\circ+(\tan 450^\circ)\cdot\sin(180^\circ)$

$-\sqrt{3}\times-\frac{\sqrt{3}}{2}$ $\quad\frac{3}{2}$

$\tan(450^\circ+30^\circ)$

$-\cot 30^\circ\cdot\sin 120^\circ$

$-\sqrt{3}\cdot\frac{\sqrt{3}}{2}=-\frac{3}{2}$

$\sin(90^\circ+30^\circ)$

$\sin(120^\circ)$

$=\boxed{0}$